

Plan for Decreasing and Evaluation the Remaining HETE II Mission Risk

Background

In the light of some recent NASA mission failures and the resulting Failure Review Board findings, the NASA Administrator has requested that the Center Director conduct critical Red Team Reviews on each of the Center's missions prior to the mission launch. Prior to the Administrator's request, the HETE II mission was nearly ready for launch. This mission, implemented in an early version of the Principal Investigator (PI) Mode, had already been judged to be of a "medium" risk by the Goddard Program Management Council. Code S at NASA Headquarters requested that GSFC postpone the launch in order to do a complete re-assessment and to find ways to lower the risk of mission failure.

Because of the PI Mode of implementation, it was not clear how much information was actually available to do a comprehensive risk assessment and a subsequent mitigation of the remaining risk. Therefore an Exploratory Team was established to review the program implementation and assess availability of information. The results of this exploratory review indicate that, although not complete, some information is indeed available so that some meaningful risk assessment and additional mitigation of mission risk is possible at this late stage of mission implementation. This plan builds upon the Exploratory Team findings and addresses how the GSFC intends to implement this additional mitigation of risk and, upon completing that, assess the remaining risk through a Red Team type of review.

Objective

The objective of this plan is to enhance the probability of mission success by better understanding the areas of risk and implementing additional risk mitigation.

Plan

As a result of the Exploratory Team findings, it was concluded that a three pronged approach would be necessary to best implement the additional mitigation of risk. These were as follows:

1. Where enough design and implementation information is available, a peer level review of the design, parts selection, operation margins, test program and analyses performed would be done. Specifically this will be done in the following areas:
 - Attitude Control System
 - Communication
 - Power
 - Command and Data Handling
 - Separation Tip Off Rates
 - Parts Usage
 - Software
 - On Orbit Operations

The charter of the Red Team is to look for potentially "fatal flaws" in each of these areas and not address mere improvements that might just marginally enhance the probability of mission success.

2. To help better assess the workmanship of the spacecraft and instrument implementation, additional vibration and thermal cycling testing would be performed. A thrust axis only vibration at acceptance levels, half expected flight duration, will help address two Pre Ship Review concerns. It was also judged that an additional 240 hours, encompassing 8 hot/cold cycles, with soak, would add a significant level of additional assurance relative to the current status.
3. To help assure a lower risk of launch and initial on orbit operations, additional operations preparations and simulations with an augmented operations staff would also be implemented.

To help implement the above mitigation as well as perform a final residual risk assessment, a Red Team, comprised mostly of GSFC technical personnel, will be formed. This Red Team membership will be such that the members themselves shall perform the individual peer reviews as indicated above. Upon completion of the peer reviews the Red Team shall recommend hardware and software redesigns as/if appropriate. These recommendations will be reviewed by the GSFC Project and Center technical management staff for implementation feasibility and implemented as appropriate. Subsequent to the implementation of these design changes, if any, the additional vibration test and thermal cycling will commence. The Red Team shall also include GSFC personnel that will be able to assess and guide the HETE II operations augmentation.

Upon the completion of the additional vibration and thermal cycling testing and the implementation of the additional operations preparations the Red Team shall assess the risk mitigation results. They shall make an assessment of the residual risks and make recommendations to the Goddard Program Management Council on the advisability and readiness to launch.

Schedule

The Red Team shall be formed immediately and shall take as a goal the completion of the specified peer reviews by March 17, 2000. The subsequent activities shall be scheduled depending upon the peer level review findings.